UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,198	11/25/2003	Shang-Hong Lai	LAIS3011/EM	4227

23364   7590   09/04/2007

BACON & THOMAS, PLLC
625 SLATERS LANE
FOURTH FLOOR
ALEXANDRIA, VA 22314

EXAMINER
LIEW, ALEX KOK SOON

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
09/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
	10/720,198	LAI ET AL.
Office Action Summary	Examiner	Art Unit	
	Alex Liew	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>01 August 2007</u>.

2a)☒ This action is **FINAL.** 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-16</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-8,10 and 11</u> is/are rejected.

7)☒ Claim(s) <u>9 and 12-16</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

U.S. Patent and Trademark Office

PTOL-326 (Rev. 08-06)   Office Action Summary   Part of Paper No./Mail Date 20070821

The amendment filed on August 1, 2007 is entered and made of record.

Response to Applicant's arguments

On page 9 in the reply, the applicant stated: [It is respectfully submitted that both Lanitis and Cootes fail to disclose or suggest the feature, positively recited in amended claim, of performing the statistical face shape model computing step including: computing a mean value of the feature points of the aligned shape vectors to define a mean shape vector x, subtracting each aligned shape vector x_a by mean shape vector x to form a matrix A, computing a covariance matrix C of the matrix A and computing a plurality of principal components according to eigenvectors to form the statistical face shape model].

The examiner agrees with the applicant. However, Turk (US pat no 5,164,992), cited in the previous office action, discloses performing the statistical face shape model computing step including: computing a mean value of the feature points of the aligned shape vectors to define a mean shape vector x, subtracting each aligned shape vector x_a by mean shape vector x to form a matrix A, computing a covariance matrix C of the matrix A and computing a plurality of principal components according to eigenvectors to form the statistical face shape model (see column 5, lines 34 to 64, performing the following functions is finding the principal components: equation 1 calculates the mean shape vector; $\Phi_i = \Gamma_i - \Psi$ is read as subtracting each aligned shape vector x_a by mean shape vector x; then Φ_i forms matrix A; C is calculated using matrix A; also see column 10, lines 23 to 28).

One skilled in the art would include step of calculating plurality of principal components

of face images because the feature of the face can be represented by a vector instead

of an entire face image, which save storage save and processing power.

The combination of Lanitis, Cootes and Turk disclose the claimed invention of claim 1.

Claim Objections

Claims 9 and 12 – 16 are objected to as being dependent upon a rejected base

claim, but would be allowable if rewritten in independent form including all of the

limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1 – 8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Lanitis (titled: Automatic face identification system using flexible

appearance models) in view of Cootes (Titled Active Shape Models – Their Training and

Application).

With regards to claim 1, Lanitis discloses a statistical facial feature extraction method,

comprising:

a first procedure for creating a statistical face shape model based on a plurality of

training face images (see page 395 second column 'Flexible Models' and models are

shown in fig 4 and 5), including

- an image selecting step, to select N training face images (see equation 1) and

- a statistical face shape model computing step, to use a principal component

  analysis process to compute a plurality of principal components based on the

  shape vectors to create a statistical face shape model, wherein the statistical

  face shape model represents the shape vectors by combining a plurality of

  projection coefficients (see page 395 second column section 'Flexible Models' –

  the coefficients are P, projecting the average, X flat hat the results are the shape

  facial models shown in fig 4).

Lanitis does show on page 395, second column, is constructing a shape model

representing the co-ordinates of landmark points, expressed in a standard frame of

reference, but does not explicitly disclose feature labeling step and aligning step.

Cootes discloses a feature-labeling step, to respectively label feature points located in n

different blocks of the training face images to define corresponding shape vectors of the

training face images (see page 41 second column section 3.1 and fig 4 – there are thirty

two points placed on the shape model) and an aligning step, to align each shape vector

with a reference shape vector to thus obtain aligned shape vectors (see page 42 first

column first paragraph of section 3.2).

One skill in the art would include a feature labeling step and aligning step because the

labeling points is able to represent boundary, internal features, exterior features such as

concave section of boundary (see page 38 of Cootes second column second

paragraph), which able to represent a human face well and saves time on processing

points as compared to entire image of the face, which has more evaluation pixels.

Lanitis also discloses a second procedure for extracting a plurality of facial features

from a test face image, including

- a test image selecting step, to select a test face image (see fig 16 – test image is

    an input to the identification system) and

- an initial guessing step, to guess initial positions test features located in the test

    face image, wherein the initial position of each test feature is a mean value of the

    feature of the aligned shape vectors (see fig 15 – shows three examples of initial

    face shape alignment with the test image, the initial face shape alignment is the

    initial guessing positions).

Lanitis shows steps of obtaining a best fit with the shape model with the test image in

figure 15, by using Euclidean transformations of the model are applied in an iterative

scheme until the model is fitted to the shape of the face presented (page 398 second

column under 'Automatic Face Identification'), which model is derived from Principal

Component Analysis from equation 2, but does not disclose a searching step to find the

best fit using feature points.

Cootes discloses a search range defining step, to define n search ranges in the test

face image, based on the initial position of each test feature point, wherein each search

range corresponds to a different block (see page 49 equation 17 – where X is a set of

point at a very rough start at approximation, see fig 20, where each point finds the best

adjustments to move to a better position, see section 4.2, where each point move within

a designated image frame), a candidate feature point labeling step, to label a plurality of

candidate feature points for each search range (see equation 19 – calculates the

suggested movements to the points x in local frame) and a test shape vector forming

step, to do combination of the candidate feature points in different search ranges in

order to form a plurality of test shape vectors (see equation 22 – 26 are test shape

vector representing each movements of the feature points being moved to an improved

position).

One skill in the art would include search range step, candidate feature point step and

test shape forming step because to maintain the global shape the face model improving

identification accuracy and results.

Lanitis and Cootes do not disclose performing the statistical face shape model-

computing step using principal component technique.

Turk discloses performing the statistical face shape model computing step including:

computing a mean value of the feature points of the aligned shape vectors to define a

mean shape vector x, subtracting each aligned shape vector x_a by mean shape vector x

to form a matrix A, computing a covariance matrix C of the matrix A and computing a

plurality of principal components according to eigenvectors to form the statistical face

shape model (see column 5, lines 34 to 64, performing the following functions is finding

the principal components: equation 1 calculates the mean shape vector; $\Phi_i = \Gamma_i - \Psi$ is

read as subtracting each aligned shape vector x_a by mean shape vector x; then Φ_i

forms matrix A; C is calculated using matrix A; also see column 10, lines 23 to 28).

One skilled in the art would include step of calculating plurality of principal components

of face images because the feature of the face can be represented by a vector instead

of an entire face image, which save storage save and processing power.

With regards to claim 2, Lanitis discloses a method as claimed in claim 1, wherein the

feature labeling step of first procedure, the feature points are coordinates for corners of

eyes and month on each training face image (see fig 5).

With regards to claim 3, Lanitis discloses all of the claim elements / features as

discussed above in rejection for claim 1 and incorporated herein by reference, but fails

to disclose manually labels the feature points of each training face image. Cootes

discloses a feature-labeling step of the first procedure manually labels the feature points

of each training face image (see page 38 second column second paragraph). One skill

in the art would include a step of manually labeling feature points because the user is

able to add or remove feature points on the face allowing the user to emphasized more

on the eyes and less on the mouth, or vice-versa, allowing flexibility in the system.

With regards to claim 4, an extension of claim 1, Cootes discloses a reference shape

vector is one of the shape vectors (see page 42 below equation 2, x_i is the reference

shape vector).

With regards to claims 5 – 7, see all of section 3.2 and 3.3, also equations 2 – 7.

With regards to claim 8, Lanitis discloses a method as claimed in claim 1, wherein the statistical face shape model is a point distribution model (see page 395 first and second column under section identification).

With regards to claim 10, an extension of claim 1, Cootes discloses a method as claimed in claim 1, wherein each shape vector x_j consists of n feature located in different blocks, so an average value as t, of feature vectors s_j corresponding to special blocks of all shape vectors x_j is defined as a feature as a template (see equation 7).

With regards to claim 11, Lanitis discloses a method as clamed in claim 1, wherein the initial guessing step of the second procedure, scaling of initial guess shapes formed by the test features aligned so similar as the test face image (see fig 15).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Alex Liew whose telephone number is (571)272-8623.

The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alex Liew
AU2624
8/21/07

MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600